Hysterectomy, endometrial ablation, and levonorgestrel releasing intrauterine system (Mirena) for treatment of heavy menstrual bleeding: cost effectiveness analysis
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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
The objective was to compare the cost-effectiveness of first and second generation techniques for endometrial ablation, hysterectomy, and a levonorgestrel-releasing intrauterine system (Mirena) for treating heavy menstrual bleeding. The authors concluded that hysterectomy was the preferred initial strategy, but the results were sensitive to the utility estimates. With some limitations, the methods seem to have been appropriate and clearly reported. The conclusions reached by the authors appear to be appropriate.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The aim was to compare the cost-effectiveness of hysterectomy, endometrial ablation, and a levonorgestrel-releasing intrauterine system (Mirena) for treating heavy menstrual bleeding.

Interventions
Four interventions were compared: Mirena, first generation techniques for endometrial ablation, second generation techniques for endometrial ablation, and traditional hysterectomy.

Location/setting
UK/secondary care.

Methods
Analytical approach:
A Markov model was constructed, with a hypothetical cohort of 10,000 eligible women aged 42 years, which was the mean age for ablation in randomised controlled trials (RCTs). The authors stated that the perspective was that of the UK NHS and the time horizon was 10 years.

Effectiveness data:
The data were from a published systematic review and meta-analysis of individual patient data, from published RCTs, that was conducted by the authors of this study. The key clinical parameters were the complication and death rates for each treatment.

Monetary benefit and utility valuations:
The utility values were from three published sources.

Measure of benefit:
The measure of benefit was quality-adjusted-life-years (QALYs).

Cost data:
The direct health care costs were those of the treatments (including in-patient and out-patient care), complications during and after operations, and adverse events. These data were from various UK sources, such as weighted mean estimates from NHS hospital episode statistics, and the National Schedule of Reference Costs. All costs were in UK pounds sterling (£), for the price year 2008, and they were inflated, where necessary. Future costs were discounted at an
annual rate of 3.5%.

Analysis of uncertainty:
The parameter uncertainty and its impact on the model results was assessed through deterministic one-way analysis, for the utility values, and subgroup analysis for short versus long uterine cavity length. A probabilistic sensitivity analysis was undertaken and the results were presented in a cost-effectiveness acceptability curve.

Results
In the base case, the total QALYs generated were 73,332 with hysterectomy, 68,566 with Mirena, 69,678 with second generation ablation, and 63,745 with first generation ablation.

The total costs were £23.00 million with hysterectomy, £16.15 million with Mirena, £19.47 million with second generation ablation, and £23.59 million with first generation ablation.

For hysterectomy, the incremental cost per QALY gained was £1,440 compared with Mirena, and £970 compared with second generation ablation. Compared with the first generation ablation, hysterectomy was dominant as it was more effective and less costly.

The results were robust to the variations in the sensitivity analysis, except for the utility values; second generation ablation was most effective when using median utility values.

Authors' conclusions
The authors concluded that hysterectomy was the most cost-effective initial intervention for heavy menstrual bleeding, at the widely accepted willingness-to-pay threshold in the UK, but the results were sensitive to the utility estimates.

CRD commentary
Interventions:
A justification was given for the selection of comparators, which were described. These might be relevant options in other settings.

Effectiveness/benefits:
The main effectiveness estimates were from an individual patient data meta-analysis of RCTs undertaken as part of a systematic review and health technology assessment (Middleton, et al. 2010, see 'Other Publications of Related Interest' below for bibliographic details). These estimates are likely to have had good internal validity. For each parameter, the authors provided its mean value, a range, and their sources. The sources for the quality of life weights were provided, but were not described and these studies should be consulted to assess their quality. QALYs were an appropriate measure of benefit, given the impact of heavy bleeding on quality of life. Discounting of the long-term benefits was not reported even though the time horizon was 10 years.

Note: correspondence with the lead author following the publication of this abstract has indicated that QALYs were, in fact discounted at 3.5%, that rate being "hard wired" into the calculations for the model.

Costs:
The costs and their sources were reported transparently and in detail. Some relevant costs were omitted, such as long-term complications, and this might have influenced the findings. The price year, currency, and discount rate were all clearly stated.

Analysis and results:
The model structure was described and a diagram was given. The authors did not discount the long-term benefits, which could have altered the cost-effectiveness results. The costs and benefits were synthesised appropriately, in an incremental analysis, and the results were transparently reported. Valid approaches were used to examine the parameter uncertainty and the findings were clearly illustrated. The probabilistic analysis found that the results were highly sensitive to the utility values. The main limitation, reported by the authors, was that not all the costs and outcomes were included. The authors compared their results with those of other published economic evaluations and discussed any
Concluding remarks:
With some limitations, the methods seem to have been appropriate and clearly reported. The conclusions reached by the authors appear to be appropriate.

Funding
Funded by the NIHR Health Technology Assessment programme, UK.

Bibliographic details

PubMedID
21521730

DOI
10.1136/bmj.d2202

Original Paper URL
http://www.bmj.com/content/342/bmj.d2202.abstract

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Contraceptive Agents, Female /administration & dosage /economics; Cost-Benefit Analysis; Endometrial Ablation Techniques /economics; Female; Health Resources /economics /utilization; Humans; Hysterectomy /economics; Intrauterine Devices, Medicated; Levonorgestrel /administration & dosage /economics; Menorrhagia /drug therapy /economics; Middle Aged; Quality-Adjusted Life Years; Randomized Controlled Trials as Topic

AccessionNumber
22011000738

Date bibliographic record published
13/07/2011

Date abstract record published
05/10/2011